REMARKS

STATUS OF CLAIMS

Please cancel Claims 1-40 and enter new Claims 41-77. After entry of this amendment, Claims 41-77 will be pending. Applicants point out that the subject matter of Claims 32-40 directed to substrates, assay products and products for separating cells has been cancelled. Support for the claim amendments can be found throughout the specification and in the claims as originally filed. No new matter has been added.

It is additionally noted that 40 claims had been previously paid for. Through this amendment, 37 claims remain in the application. It is respectfully submitted that no additional claim fees are required.

35 U.S.C. §112, SECOND PARAGRAPH REJECTIONS

Claims 1-40 stands rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite as detailed below.

Claim 1's recitation of "at least one plasma monomer..." and "means are provided which move the monomer source across a surface **to be treated** to manufacture a non-uniform plasma monomer surface." As the aforementioned terms no longer appear in the claim set, these rejections are now moot. Applicants point out that the organic compound present in a plasma prior to polymerization is often referred to as the "monomer" whereas the deposit is often referred to as the "plasma polymer" (see US2006/0166183, e.g., paragraph [0013], lines 11-13). For greater clarity, the term "monomer" in the claim set now appears as the phrase "organic compound monomer." Applicants further point out that the organic compound monomer is described in detail in the present application (see US2006/0166183, e.g., paragraphs [0031] to [0050]).

Claim 1's recitation of "non-uniform" describing "a non-uniform plasma polymer surface." The term "non-uniform" is described in the specification, e.g., see US2006/0166183, paragraph [0021], reproduced as follows. "Non-uniform refers to surfaces which have a **heterogeneous chemical and/or physical structure**" (emphasis added). Non-uniform surfaces of the present invention are further described and contrasted with uniform plasma polymerized surfaces previously described in WO01/31339. For example, see US2006/0166183 paragraphs [0016], [0017], and [0019] reproduced below for the reader's convenience (emphasis added).

> [0016] The technique disclosed in WO01/31339, although effective with respect to providing **uniform plasma polymerised surfaces** to which biomolecules bind with specificity and affinity, is **not sufficiently versatile to provide a surface which has diverse chemical or physical properties**.
>
> [0017] The method herein disclosed allows the provision of surfaces that are non-uniform and define local surface regions that have **different chemical and/or physical properties**. We refer to these surfaces as "patterned" in both chemistry and topography. The effect is achieved by drawing off a proportion of the plasma through a micrometre scale orifice(s) which is translated across the surfaces to be patterned. Alternatively, a plasma may be excited at the tip, or within a microcapilliary which can then be used to "write" the molecular architecture and chemistry onto the surface. Chemistry and molecular architecture maybe varied vertically (Z-direction) and/or laterally (X-Y plane) by changing the key plasma parameters (power, flow rate, pulse duty cycle or monomer composition), or by altering the portion of the plasma 'drawn off' by physical, electrical or magnetic means during writing. These surfaces allow the immobilisation of different molecules and concentrations of molecules at a micron scale. Similarly, this technique may be used to control the local wettability, adhesion and frictional/wear characteristics on a surface, and have application in microfluidics.
>
> [0019] We herein disclose a method we refer to as "plasma writing" which provides **surfaces that are characterised by chemical and structural micropatterns or gradients extending, typically into three dimensions**, wherein the X-Y plane is defined by the surface, and the Z-direction is substantially perpendicular thereto. The invention relates to a method of creating **both**

> **chemical and molecular architectures onto a surface, to give rise to two or three-dimensional patterns, without the need to prefabricate masks or stencils**, as described in Dai et al., Journal of Physical Chemistry B 101:9548-54 (1997) and **without limitation in the number or type of different architectures created on a single surface as part of the same process**.

In light of the aforementioned excerpts from the specification, Applicants believe that the term "non-uniform" clearly refers to **heterogeneous chemical and/or physical structure**. Nonetheless, to expedite prosecution, the term "non-uniform" has been further elaborated and now appears in the claim set as the phrase "non-uniform characteristics selected from the group consisting of being heterogenous chemically, heterogeneous physically or combinations thereof."

Claims 7-11 and 13's recitation of "volatile" as "virtually any material is 'volatile' dependent on conditions that cause evaporation or sublimination" (see Office Action, mailed November 21, 2008, page 2, 3rd paragraph, lines 3-4). Applicants, however, point out that the term "volatile" in the claim set does not encompass any material but refers to a specific type of compound. In particular, an alcohol (claim 47), an acid (claim 48), an amine (claim 49), a hydrocarbon (claim 50), a fluorocarbon (claim 51), and a siloxane (claim 53).

Claim 33's recitation of "high" and "low" with regard to high-density polyethylene and low-density polyethylene, respectively. Applicants contend that one of skill in art would readily understand the meaning of these terms. Nonetheless, to expedite prosecution, the terms "high-density polyethylene" and "low-density polyethylene" no longer appear in the claim set. Rather, "polyethylene" now appears in the claim set. It is understood that the term "polyethylene" includes both "high-density polyethylene" and "low-density polyethylene." As the terms "high" and "low" no longer appear in the claim set, this rejection is now moot.

Use of the prefix "micro" and "macro." Specifically,

- Claim 35's use of the prefix "micro" with regard to the recitation of "microarray."

- Claim 36's use of the prefix "micro" with regard to the recitation of "microtitre."
- Claim 37's use of the prefix "macro" with regard to the recitation of "macromolecules."
- Claim 38's use of the prefix "micro" with regard to the recitation of "microfluidic."

Applicants contend that one of skill in the art would readily understand the terms "microarray," "microtitre plate," "microfluidic," and "macromolecule" (see US2006/0166183, e.g., paragraph [0004] (with regard to microarray), paragraph [0010] with regard to microfluidic). As neither the prefixes "micro" or "macro" nor the terms "microarray," "microtitre," "microfluidic," or "macromolecule" appear in the claim set, these rejections are now moot.

Claim 34's recitation of "assay product." In light of the cancellation of the subject matter Claim 34, this rejection is now moot.

Claim 39 and 40's recitation of "for use with an array printer" and "for use with an array reader," respectively. In light of the cancellation of Claim 34, this rejection is now moot.

Claim 12 and 18's recitation of the term "ethylene-oxide type monomer" is described in the specification, e.g., see US2006/0166183, paragraph [0014], wherein the following excerpt has been extracted. "Suitably, the monomers are ethylenically unsaturated. Thus the functional group compound maybe unsaturated carboxylic acid, alcohol or amine, for example, whilst the hydrocarbon is suitably an alkene. By plasma polymerization, it is also possible to deposit **ethylene-oxide type molecules** (e.g., tetraethyleneglycol monoallyl ether) to form 'non-fouling' surfaces" (emphasis added). Nonetheless, to expedite prosecution, the term "ethylene-oxide type monomer" no longer appears in the claim set. Rather, "tetraethyleneglycol monoallyl ether" now appears in the claim set. As noted above, "tetraethyleneglycol monoallyl ether" is representative of the ethylene-oxide type molecules referred to in the excerpt reproduced above.

Claim 17 is objected to as being in improper dependent form for failing to further limit the subject matter of a previous claim. In light of the cancellation of Claim 17, this rejection is now moot.

Claim 24's recitation of the term "vapour." Although the term "vapour" is clear, to expedite prosecution, the term "vapour" no longer appears in the claim set. Rather, the American English spelling "vapor" now appears. In addition, as suggested by the Examiner, Applicants have recited the temperature to further outline the conditions at which the vapor pressure is at least $6.6x10^{-2}$ mbar.

Claim 26's recitation of "...one organic monomer with at least one hydrocarbon." The phrase "...one organic monomer with at least one hydrocarbon" no longer appears in the claim set. Rather, "at least one organic compound monomer that comprises at least one hydrocarbon" now appears in the claim set.

Claims 28 and 29's minor typographical errors. In light of the cancellation of Claims 28 and 29, these rejections are now moot.

With regard to other typographical errors present in the specification, such as the use of "eg" rather than "e.g." and the lack of improper superscripting, Applicants request an *Ex parte Qualye* action to address these matters once prosecution on the merits is closed.

The claim amendments are believed to address all 35 U.S.C. §112, second paragraph rejections stated in the Office Action mailed November 21, 2008. In view of the aforementioned remarks, Applicants respectfully request withdrawal of these rejections under 35 U.S.C. §112, second paragraph.

DOUBLE PATENTING REJECTIONS

Claims 1-10, 14-17, 19-22, and 24-40 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 29-47 and 50-53 of copending Application No. 11/269,427. Applicants point out that Application No. 11/269,427 has been abandoned for failure to respond to an Office Action. Thus, this rejection no longer applies.

Claims 32, 34 and 37-40 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 1-27 of copending Application No. 10/599,943. As the subject matter of Claims 32, 34 and 37-40 have been cancelled, this rejection is now moot.

Claims 1-40 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 1-43 of copending Application No. 10/560,210. Upon indication of allowable subject matter, Applicants will consider the need to file a terminal disclaimer to obviate the concern of this nonstatutory obviousness-type double patenting rejections.

35 U.S.C. §102 REJECTIONS

Claims 32-40 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Goessl et al. (Plasma Lithography – thin-film patterning of polymers by RF plasma polymerization II: Study of differential binding using adsorption probes," *J Biomater Sci Polymer Edn*, 12(7):739-753 (2001)). As the subject matter of Claims 32-40 have been cancelled, this rejection is now moot.

Claims 32-40 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by France et al., "Plasma copolymerization of allyl alcohol/1,7-octadiene surface characterization and attachment of human keratinocytes," *Chem Mater*, **10(4)**:1176-1183 (1998) or France et al.,

Attachment of human keratinocytes to plasma co-polymers of acrylic acid/octa-1,7-diene and allyl amine/octa-1,7-diene," *J Mater Chem*, **81(1)**:37-42 (1998). As the subject matter of Claims 32-40 have been cancelled, this rejection is now moot.

Claims 1-2, 5, 10, 13-14, 24, 29, and 32-33 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Renner et al. (DD 94657). As noted above, the subject matter of Claims 32 and 33 have been cancelled, thus this rejection is moot with respect to Claims 32-33 but will be addressed with respect to the subject matter of Claims 41-77.

Renner et al. describe protective coatings, preferably for a magnetic storage medium, such as is used, for instance in electronic computers and data processing systems, and methods for manufacturing the same. In contrast to the presently claimed invention, wherein the methods comprise moving at least one of the source of plasma and the substrate relative to one another during plasma deposition such that at least part of the substrate has a plasma polymer deposit that has non-uniform characteristics selected from the group consisting of being heterogenous chemically, heterogeneous physically, and combinations thereof to define a heterogeneous surface on the substrate, only one of the two examples provided by Renner et al. even mentions motion of the substrate and does not even describe the motion as being relative to the source of plasma. Specifically, Renner et al. state, "The tape runs at a speed of 15 cm/min and is coated with an impact and shock resistant 1 μm thick protective coating once it has passed through the electrodes" (see translation of Renner et al., Example 2, more specifically, page 3, 2nd full paragraph, last sentence). Moreover, despite the motion of substrate mentioned by Renner et al., nowhere is the plasma polymer deposit described as being heterogenous chemically and/or heterogeneous physically. Rather, as evidenced above, the coating is simply described as being 1 μm thick, thus not heterogenous physically. Likewise, the source of plasma for this coating is octamethyltrisiloxane alone, thus not heterogeneous chemically. Consequently, Renner et al. does not anticipate the presently claimed invention.

Claims 32-34 and 37-40 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Timmons et al. (6,306,506 B1). As the subject matter of Claims 32-34 and 37-40 have been cancelled, this rejection is now moot.

Claims 1-2, 4-11, 14-17, 19-27, 32-34 and 37-40 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Nomura et al. (5,843,789). As noted above, the subject matter of Claims 32-34 and 37-40 have been cancelled, thus this rejection is moot with respect to Claims 32-34 and 37-40 but will be addressed with respect to the subject matter of Claims 41-77.

Nomura et al. describe porous materials (i.e., for blotting and blot/transfer membranes useful in the analysis of nucleic acids and proteins) modified by means of a plasma polymer deposit and methods of making the same. Unlike the presently claimed invention, the plasma polymer deposit of Nomura et al. is neither chemically heterogeneous nor physically heterogeneous such that it provides a heterogeneous surface on a substrate. In fact, all of the embodiments exemplified by Nomura et al. employ a single monomer as a source of plasma (i.e., acrylic acid or allylamine). Likewise, Nomura et al. state that "The plasma polymerizate deposits are of sufficient thinness as not to significantly impeded ingress of solvents and biomatter into surface pores, that is, **surface porosity remains essentially unchanged overall** (see, Nomura et al., column 4, lines 13-16). Thus, the plasma polymer deposit of Nomura et al. must provide a physically homogeneous, not heterogeneous, surface so as to avoid altering the surface porosity of the substrate. Otherwise, the use of these porous materials as tools for analyses of proteinaceous and genomic matter would be compromised. Consequently, Nomura et al. cannot anticipate the presently claimed invention.

Claims 32-34 and 38 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Oka et al. (4,562,725). As the subject matter of Claims 32-34 and 38 have been cancelled, this rejection is now moot.

Claims 1-2, 4-6, 9-11, 13-17, 19-23, 25-27, 32-33 and 37-40 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Hu et al. (5,463,010). As noted above, the subject matter of Claims 32-33 and 37-40 have been cancelled, thus this rejection is moot with respect to Claims 32-33 and 37-40 but will be addressed with respect to the subject matter of Claims 41-77.

Hu et al. describe plasma polymerized membranes and methods for preparing the same. Unlike the presently claimed invention, wherein the methods comprise moving at least one of the source of plasma and the substrate relative to one another during plasma deposition such that at least part of the substrate has a plasma polymer deposit that has non-uniform characteristics selected from the group consisting of being heterogenous chemically, heterogeneous physically, and combinations thereof to define a heterogeneous surface on the substrate, Hu et al. describe the plasma polymer deposition as providing a uniform coating. Specifically, Hu et al. state that, "This membrane coating provides a **uniform**, pinhole free and ultra-thin siloxane biocompatible, thromboresistant, insulating, gas permeable membrane suitable for virtually any substrate surface. The foregoing, and other features and objects of the present invention, are realized in the compositions described and claimed herein" (emphasis added, Hu et al., column 4, lines 14-20). Thus, Hu et al. cannot anticipate the presently claimed invention.

In view of the aforementioned remarks, Applicants respectfully request withdrawal of these rejections under 35 U.S.C. §102(b).

35 U.S.C. §103 REJECTION

Claims 3, 26 and 33 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Renner et al. (DD 94657). As noted above, the subject matter of Claim 33 has been cancelled, thus this rejection is moot with respect to Claim 33 but will be addressed with respect to the subject matter of Claims 41-77.

As noted above, Renner et al. describe protective coatings, preferably for a magnetic storage medium, such as is used, for instance in electronic computers and data processing systems, and methods for manufacturing the same. Unlike the presently claimed invention, wherein the methods comprise moving at least one of the source of plasma and the substrate relative to one another during plasma deposition such that at least part of the substrate has a plasma polymer deposit that has non-uniform characteristics selected from the group consisting of being heterogenous chemically, heterogeneous physically, and combinations thereof to define a heterogeneous surface on the substrate, Renner et al. describes motion of the substrate as a means to enhance homogeneity of the protective coating. Specifically, Renner et al. state, "It is advantageous to keep the magnetic storage medium to be coated in motion during the precipitation and polymerization processes. This **enhances the homogeneity** of the protective coating" (emphasis added, see translation of Renner et al., page 2, 3rd paragraph, 4th sentence). Moreover, Renner et al. emphasizes that "the protective coating according to the invention has a series of valuable characteristics: **homogeneity**, good adhesion to substrate, good elasticity, corrosion resistance, thermal resistance and freedom from pores" (emphasis added, see translation of Renner et al., page 2, 5th paragraph, 1st sentence). Thus, one of skill in the art would not be motivated to produce a plasma polymer deposit that has non-uniform characteristics as presently claimed based on the teachings of Renner et al.

In fact, both examples of Renner et al. state that the result of the process described therein is a coating with a thickness of 1μm (see translation of Renner et al., Examples 1 and 2, more specifically, page 3, 1st paragraph, line 15 and 2nd full paragraph, last sentence). Thus, the plasma polymer deposit is not heterogenous physically. Likewise, although Renner et al. state that a mix of monomers could be used for the plasma, both examples described by Renner et al. use a single compound as a source of plasma (i.e., hexamethyldisiloxane in Example 1 and octamethyltrisiloxane in Example 2) and no other monomers are disclosed or suggested by Renner et al. As the two preferred embodiments of Renner et al. only use a single monomer as a source of plasma, one of skill in the art would not be motivated to use a mix of monomers,

particularly as no other monomer or even a combination of the two exemplified are described therein.

Claims 1-4, 8, 10, 12, 14-19, 22, 24 and 32-33 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Badyal et al. (6,358,569 B1) in view of Renner et al. (DD 94657), and optionally considering Nomura (6,022,602). Similarly, **Claims 5-6, 9-11, 13, 20-21, 23, and 25-27** stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Badyal et al. (6,358,569 B1) in view of Renner et al. (DD 94657), and further in view of Nomura (6,022,602). As noted above, the subject matter of Claims 32-33 have been cancelled, thus this rejection is moot with respect to Claims 32-33 but will be addressed with respect to the subject matter of Claims 41-77.

Badyal et al. describes methods of applying a fluoropolymer film to a body (e.g., usable in polymeric filter media). In particular, Badyal et al. state, "The body may be a film (not necessarily microporous) or of other geometry that allows coating by plasma polymerization to a standard of consistency adequate for the end use. The method may be stopped at any stage, when the applied film is continuous and impervious or at an earlier stage, when it is to a greater or lesser extent still apertured, i.e. **has not yet completely filled in the underlying pores of the body**" (emphasis added see Badyal et al., column 1, lines 45-52). As discussed above in Nomura et al. (5,843,789), one of skill in the art would not wish to compromise the utility of substrates where porosity is required as in the membranes disclosed therein.

It is noted that Badyal et al. differs from the claims by not discussing if there is any movement of substrate or monomer source during the plasma polymerization process. See Office Action mailed November 21, 2008, page 15, last paragraph, 1st sentence. As discussed above, Renner et al. emphasizes the importance of homogeneity of the polymer deposit which forms the protective coating. Specifically, Renner et al. state, "It is advantageous to keep the magnetic storage medium to be coated in motion during the precipitation and polymerization processes. This

enhances the homogeneity of the protective coating" (emphasis added, see translation of Renner et al., page 2, 3rd paragraph, 4th sentence). Moreover, Renner et al. emphasizes that "the protective coating according to the invention has a series of valuable characteristics: **homogeneity**, good adhesion to substrate, good elasticity, corrosion resistance, thermal resistance and **freedom from pores**" (emphasis added, see translation of Renner et al., page 2, 5th paragraph, 1st sentence). Thus, one of skill in the art would not be motivated to only partially coat a substrate with pores as Renner et al. specifically emphasizes that the value of having **freedom from pores** in the protective coating. Consequently, one would not apply the plasma polymerization methods taught by Renner et al. to the substrates of Baydal et al. to produce substrates that are **not** free from pores.

Nomura et al. describe methods of modifying the lumen surface of a tube by plasma polymerization. However, in contrast to the presently claimed invention, Nomura et al. emphasizes that the coatings provided therein are uniform in thickness. See, Nomura et al., e.g., column 9, lines 62-63, column 12, lines 42-47, and Examples 1-6. Moreover, in contrast to Nomura et al. which is exclusively directed to coating the **lumen** of a tube, Baydal et al. is directed to coating the surface of a substrate while maintaining the underlying porosity of the body. Thus, one of skill in the art would not be led to combine the aforementioned references to produce the methods of the presently claimed invention.

Claims 1-27, 29-33 and 37-38 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Muguruma et al. (7,087,149 B1 ≡ WO 00/63685) in view of Renner et al. (DD 94657). As noted above, the subject matter of Claims 32-33 and 37-38 have been cancelled, thus this rejection is moot with respect to Claims 32-33 and 37-38 but will be addressed with respect to the subject matter of Claims 41-77.

Muguruma et al. describe a plasma polymerized membrane and methods of making the same. Unlike the presently claimed invention, Muguruma et al. emphasize the **uniform coating of the**

plasma polymerized membranes provided therein. See Muguruma et al., column 11, lines 9-11 and lines 21-23).

It is noted that Muguruma et al. differs from the claims by not discussing if there is any movement of substrate or monomer source during the plasma polymerization process. See Office Action mailed November 21, 2008, page 18, 1st full paragraph, 1st sentence. As discussed above, Renner et al. emphasizes the importance of homogeneity of the polymer deposit which forms the protective coating. Specifically, Renner et al. state, "It is advantageous to keep the magnetic storage medium to be coated in motion during the precipitation and polymerization processes. This **enhances the homogeneity** of the protective coating" (emphasis added, see translation of Renner et al., page 2, 3rd paragraph, 4th sentence). Moreover, Renner et al. emphasizes that "the protective coating according to the invention has a series of valuable characteristics: **homogeneity**, good adhesion to substrate, good elasticity, corrosion resistance, thermal resistance and **freedom from pores**" (emphasis added, see translation of Renner et al., page 2, 5th paragraph, 1st sentence). Thus, one of skill in the art would not be motivated to apply the plasma polymerization methods taught by Renner et al. to the substrates of Muguruma et al. to produce substrates that are **not** free from pores. In addition, the substrates exemplified by Renner et al. and Muguruma et al. are from disparate fields. Renner et al. relates to magnetic storage medium whereas Muguruma et al. relates to bio-sensors. Consequently, one of skill in the art would not apply the methods of Renner et al. to the substrates of Muguruma et al to produce the methods of the presently claimed invention.

Claims 34-36 and 39-40 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Muguruma et al. (7,087,149 B1 or WO 00/63685) in view of Renner et al. (DD 94657), further in view of France et al. ("Attachment..." or "Plasma...") or Goessl et al. As the subject matter of Claims 34-36 and 39-40 have been cancelled, this rejection is now moot.

In view of the aforementioned remarks, Applicants respectfully request withdrawal of these rejections under 35 U.S.C. §103. As the subject matter of Claims 34-36 and 39-40 have been cancelled, this rejection is now moot.

OTHER ART OF INTEREST

Applicants note that other art of interest has been cited but not applied. Specifically,

- Kurosawa et al., Absorption of anti-human IgG to plasma polymerized allylamine film formed on silver plate," Polymers for advanced technologies, 2:253-259 (1991).
- Timmons et al. (5,876,753)
- Timmons et al. (2003/0113477 A1)
- Timmons et al. (2002/0004104 A1) which contain teachings analogous to those found in Timmons et al. (6,306,506 B1)
- Kolluri et al. (6,277,449)

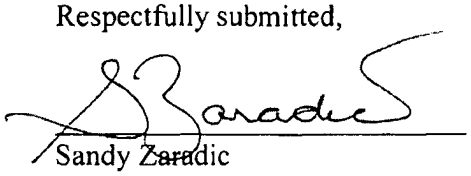
In light of the aforementioned amendments and arguments, Applicants believe the present claims are patentable over these cited documents as well.

CONCLUSION

Applicants believe Claims 41-77 are in condition for allowance and respectfully request the same.

If there are any questions or if additional information is required, the Examiner is respectfully requested to contact Applicant's attorney at the number listed below.

Respectfully submitted,



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